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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,310	10/31/2003	Ian Robinson	NG(ST)-6564	5457

26294 7590 04/03/2009
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EXAMINER	
LEE, SIU M	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
04/03/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/700,310	ROBINSON, IAN	
	Examiner	Art Unit	
	SIU M. LEE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 03 December 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-5,7,9-11,34,37,44,49-52 and 54-64 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-5,7,9-11,34,37,44,49-52 and 54-64 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 31 October 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 3-5, 7, 9-11, 34, 37, 44, 49-52, 54-64 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

2. Claims 1, 7, and 56 are objected to because of the following informalities:

(1) Regarding claim 1:

Line 7-8 recites "a time division demultiplexer that separate the plurality of time interleaved digital signals into the plurality of analog carrier signals". According to figure 5 of the instant application, the time division demultiplexer receives the analog signal form the DAC 164. The examiner suggests changing the limitation to "a time division demultiplexer that separate the plurality of time interleaved **analog** signals into the plurality of analog carrier signals".

(2) Regarding claim 7:

Lines 1-2 recites "The assembly of claim 1, the at a given stopband filter from the at least one passband filter". The examiner suggests changing to "The assembly of claim 1, the at least one stopband filter".

(3) Regarding claim 56:

Line 5-6 recites "representation of each analog the multi-carrier signal". The examiner suggests changing to "representation of each analog multi-carrier signal".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 44, 49-52, 54-55 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 44 recites (a) "the signal combiner comprising a bypass such that an analog signal from at least one of the pluralities of antennas can bypass the signal combiner" and (b) "an analog –to-digital converter that creates a digital representation of the multi-carrier signal".

With respect to (a), the examiner resume the claim is direct to the configuration of the receiver as shown in figure 9 and the bypass is refer to the tracking assembly 502. According to the specification, paragraphs 60-62 describes the operation of the tracking assembly 502, the signal from the antenna 504 is transmit to the digital processing assembly 514 in two path, the first path is through the tracking assembly 502 and the second path is through the tunable/selectable stop band filter 516, amp 518, mixer 520, combiner 522 and analog-to-digital converter 524, the signal from

antenna 504 is transmitted through the first path and the second path. The examiner does not see the signal combiner comprising a bypass such that an analog signal that can bypass the signal combiner in figure 9. Moreover, the bypass (the examiner assume the bypass is the tracking assembly) is not part of the signal combiner and therefore, the combiner does not comprises a bypass.

With respect to (b), line 4-5 recites "an analog-to-digital converter that converts the analog multi-carrier signal into a digital multi-carrier signal"; the examiner assume the analog-to-digital converter recites in line 9 is different from the analog-to-digital converter that recites in lines 4-5. If the analog-to-digital converter is the analog-to-digital converter 512 in figure 9, analog-to-digital converter 512 does not creates a digital representation of the multi-carrier signal recited in line 5 of claim 44; instead analog-to-digital converter 512 only creates a digital representation of the analog signal receiver by antenna 504.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 34 and 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toivola (US 6,081,515) in view of Bada et al. (US 6,611,565 B1).

(1) Regarding claim 34:

Toivola discloses a method of transmitting a multi-carrier signal (the examiner interprets a multi-carrier signal is a multi-frequency signal as signal output from the combiner 1 in figure 3), comprising:

generating a multi-carrier signal at an exciter (frequency combiner 1 in figure 3, by the combination in the combiner device 1 a multi-frequency signal is received, column 6, lines 13-15, lines 33-34);

distributing the multi-carrier signal into a plurality of analog signals (power combiner 3 is basically the same as a power divider, column 6, lines 44-46), where distributing the analog multi-carrier signal comprises filtering a plurality of copies of the multi- carrier analog signal at respective tunable filters (each signal output from the power combiner 3 is filtered by electrically controllable filter $4_1...4_n$ as shown in figure 3, column 6, lines 53-64), at least one of the tunable filters being a multiband tunable filter (it is easy to take action or change or amend the frequency setting of other filter, column 7, lines 34-35, for a special embodiment all controllable filters in the arrangement can be tuned to same frequency, alternatively, certain filters can be tuned to the same frequency, while other are tuned to in to another or different frequency and so on, column 8, lines 6-12, since the frequency setting of the controllable filter can be changed or amended, the examiner interprets the electrically controllable filter as a multiband tunable filter); and

providing the plurality of analog signals to respective antennas for transmission (the output of the electrically controllable filter $4_1...4_n$ are output to the amplifier $5_1...5_n$

and transmit from the antenna $6_1 \ldots 6_n$ as shown in figure 3, column 6, lines 54 – column 7, lines 4).

Toivola fails to disclose generating a digital multi-carrier signal at an exciter and converting the digital multi-carrier signal into an analog multi-carrier signal.

However, Bada et al. discloses a transmitter comprising means for digital modulation of a multicarrier signal; means for summing the numeric samples of the modulation carriers; and means for conversion to analogue from (DAC) of the signal (figure 8, column 6, lines 41-48).

It is desirable to generate a digital multi-carrier signal at an exciter and converting the digital multi-carrier signal into an analog multi-carrier signal because through digital processing, it can increase the space of the useful signal from the continuous base band spectrum. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Bada et al. in the method of Toivola to improve the throughput of the transmitting method.

(2) Regarding claim 37:

Toivola discloses the distributing of the analog multi-carrier signal comprising deserializing a plurality of carrier signals comprising the multi-carrier signal (splitting the multicarrier signal and filtered by electrically controllable filter $4_1 \ldots 4_n$ put the multicarrier signal into a single frequency signal transmitted by each antenna $6_1 \ldots 6_n$ as shown in figure 3, column 6, lines 54 – column 7, lines 4).

7. Claims 1, 4, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toivola (US 6,081,515) in view of Jeong et al. (US 2002/0080887 A1), Campanella (US 6,944,139 B1) and Schilling (US 6,115,368).

(1) Regarding claim 1:

Toivola discloses a method of transmitting a multi-carrier signal (the examiner interprets a multi-carrier signal is a multi-frequency signal as signal output from the combiner 1 in figure 3), comprising:

generating a multi-carrier signal at an exciter (frequency combiner 1 in figure 3, by the combination in the combiner device 1 a multi-frequency signal is received, column 6, lines 13-15, lines 33-34);

distributing the multi-carrier signal into a plurality of analog signals (power combiner 3 is basically the same as a power divider, column 6, lines 44-46), where distributing the analog multi-carrier signal comprises filtering a plurality of copies of the multi- carrier analog signal at respective tunable filters (each signal output from the power combiner 3 is filtered by electrically controllable filter $4_1 \ldots 4_n$ as shown in figure 3, column 6, lines 53-64), at least one of the tunable filters being a multiband tunable filter (it is easy to take action or change or amend the frequency setting of other filter, column 7, lines 34-35, for a special embodiment all controllable filters in the arrangement can be tuned to same frequency, alternatively, certain filters can be tuned to the same frequency, while other are tuned to in to another or different frequency and so on, column 8, lines 6-12, since the frequency setting of the controllable filter can be

changed or amended, the examiner interprets the electrically controllable filter as a multiband tunable filter); and

providing the plurality of analog signals to respective antennas for transmission (the output of the electrically controllable filter $4_1 ... 4_n$ are output to the amplifier $5_1 ... 5_n$ and transmit from the antenna $6_1 ... 6_n$ as shown in figure 3, column 6, lines 54 – column 7, lines 4).

Toivola fails to disclose (a) a digital exciter that provides a digital multi-carrier signal from baseband data, the digital multi-carrier signal comprising a plurality of time interleaved digital signals; and a digital-to-analog converter that converts the digital multi-carrier signal into an analog multi-carrier signal; and (b) the signal distributor comprising a time division demultiplexer that separate the plurality digital signals into the plurality of analog carrier signals; and (c) at least one stopband filter having at least one stopband, each of the at least one stopband having an associated center frequency, the digital exciter being operative to adjust the respective center frequencies of the at least one stopband.

With respect to (a), Jeong et al. discloses a digital exciter that provides a digital multi-carrier signal from baseband data, the digital multi-carrier signal comprising a plurality of time interleaved digital signals; and a digital-to-analog converter that converts the digital multi-carrier signal into an analog multi-carrier signal (an OFDM transmitter in figure 1 generating an OFDM symbol by source coding part 10, scrambler 20, outer coder 30, outer interleaver 40, inner coder 50, inner interleaver 60 (inner interleaver 60 is constructed with a time interleaver and a frequency interleaver,

paragraph 0069), signal mapper 70, frame adaptor 90, and IFFT block 100, and the generated OFDM symbol is converted to analog signal by D/A converter 120 as shown in figure 1, paragraph 0048).

It is desirable to have a digital exciter that provides a digital multi-carrier signal from baseband data, the digital multi-carrier signal comprising a plurality of time interleaved digital signals; and a digital-to-analog converter that converts the digital multi-carrier signal into an analog multi-carrier signal because it can randomize the error and improve the integrity of the transmitted and received signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Jeong et al. in the transmitter of Toivola to improve the tolerance to interference.

With respect to (b), Campanella discloses using a time division demultiplexer (time division demulitplexer 102) in figure 3) to separate a serial TDM bit stream into plurality of carrier signal (column 9, lines 18-24).

It is desirable to use a time division demultiplexer to separate a serial TDM bit stream into plurality of carrier signal because it can eliminates difference in channel timing. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Campanella in the transmitter of Toivola and Jeong et al. to improve the alignment of signals.

With respect to (c), Schilling discloses at least one stopband filter (notch filter) having at least one stopband (notching frequency), each of the at least one stopband having an associated center frequency (the adjustable-notch filter 725 has its center

frequency, column 9, lines 15-16), the digital exciter being operative to adjust the respective center frequencies of the at least one stopband (the base station may have a sensor which detects the microwave power or energy (interference) of the one or more fixed service, the sensor determines the center frequency ad the bandwidth of the fixed-service and then the controller 726 in figure 4c adjusts the adjustable–notch filter 725 to notch the spread-spectrum processed data at this frequencies and bandwidth, column 9, lines 35-42).

It is desirable to have at least one stopband filter having at least one stopband, each of the at least one stopband having an associated center frequency, the digital exciter being operative to adjust the respective center frequencies of the at least one stopband because it avoid interfering with the co-existed services. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Schilling in the transmitter of Toivola, Jeong et al. and Campanella to be adaptive to the changing environment.

(2) Regarding claim 4:

Toivola discloses the signal distributor further comprising at least one passband filter (electrically controllable filter $4_1...4_n$ in figure 3) having at least one passband, each of the at least one passband having an associated center frequency, the digital exciter (base station) being operative to adjust the respective center frequencies of the at least one passband (controllable filter arrangements provided in the antenna arrangement are tuned, 180, which suitable is done via the base station, column 10, lines 20-23; it is

inherent that a controllable bandpass filter has at least one passband having an associated center frequency).

(3) Regarding claim 5:

Toivola discloses a given bandpass filter (electrically controllable filter $4_1...4_n$ in figure 3) from the at least one passband filter having a plurality of passbands (controllable filter arrangements provided in the antenna arrangement are tuned, which suitable is done via the base station, column 10, lines 20-23; it is inherent that a controllable bandpass filter has a plurality of passband having an associated center frequency), each of the respective center frequencies of the plurality of passbands being electrically adjustable by the exciter (electrically controllable filter $4_1...4_n$ in figure 3 is tuned by the base station, column 10, lines 20-23).

(4) Regarding claim 7 (the examiner assume the claim means "the at least one stopband filter having a plurality of stopbands):

Schilling further discloses the at least one stopband filter (adjustable notch filter 725 in figure 4c) having a plurality of stopband (since adjustable notch filter 725is adjustable, it is inherent that the adjustable notch filter 725 has a plurality of stopband, the adjustable notch filter 725 has its center frequency and bandwidth, column 9, lines 15-20), each of the respective center frequencies of the plurality of stopbands being electrically adjusted by the exciter (controller 726 in the base station, figure 4c, the base station may have a sensor which detects the microwave power or energy of the one or more fixed-services, the sensor determines the center frequency and the bandwidth of

the fixed-service and the controller 726 adjusts the adjustable-notch filter 725 to notch the spread-spectrum processed data at those frequencies, column 9, lines 25-42).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toivola (US 6,081,515) in view of Jeong et al. (US 2002/0080887 A1), Campanella (US 6,944,139 B1) and Schilling (US 6,115,368) as applied to claim 1 above, and further in view of Lau et al. (US 6,291,924 B1).

Toivola, Jeong et al., Campanella, and Shilling disclose all the subject matter as discuss in claim 1 except the at least one stopband filter comprising a surface acoustic wave (SAW) filter having at least one electrically actuatable micromechanical structures.

However, Lau et al. discloses a surface acoustic wave (SAW) filter having at least one electrically actuatable micromechanical structures (column 9, lines 9-14, line 59-column 10, line 24, and figure 22).

It is desirable to surface acoustic wave (SAW) filter having at least one electrically actuatable micromechanical structures because it avoids the need to fabricate a new SAW device (column 1, lines 62-63). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Lau et al. in the system of Toivola, Jeong et al., Campanella, and Shilling to improve the flexibility of the system.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toivola (US 6,081,515) in view of Jeong et al. (US 2002/0080887 A1), Campanella (US

6,944,139 B1) and Schilling (US 6,115,368) as applied to claim 1 above, and further in view of Pratt (US 6,664,921 B2).

Toivola, Jeong et al., Campanella, and Shilling discloses all the subject matter as discuss in claim 1 except the signal distributor comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal.

However, Pratt discloses the signal distributor (plurality of channel 167) comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal (the plurality of channels 167 each containing a mixer 167A which receives the same respective code as that applied in respect of the relevant antenna in mixer 150C, this has the effect of isolating the representation of the respective received signal at the output of the mixer 167A, this output representation then being split into plural sub-channel 169, column 10, lines 3-10).

It is desirable for the signal distributor comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal because it improves the phase tracking accuracy (column 2, lines 60-64). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Pratt in the system of Toivola, Jeong et al., Campanella, and Shilling to improve the performance of the system.

10. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toivola (US 6,081,515) in view of Jeong et al. (US 2002/0080887 A1), Campanella

(US 6,944,139 B1) and Schilling (US 6,115,368) as applied to claim 1 above, and further in view of Naidu et al. (US 5,805,983).

(1) Regarding claim 10:

Toivola, Jeong et al., Campanella, and Shilling discloses all the subject matter as discuss in claim 1 except the exciter and the digital-to-analog converter being located at a first location, and at least one of the pluralities of antennas being located at a second location, spatially remote from the first location.

However, Naidu et al. discloses the exciter and the digital-to-analog converter being located at a first location, and at least one of the plurality of antennas being located at a second location, spatially remote from the first location (base station 50_1 and 50_2 are connected to the remote antenna 68_1, 68_2, 70_1 and 70_2 through fiber node 58 and coaxial cable 60, column 1, line 58-column 2, line1).

It is desirable for the exciter and the digital-to-analog converter being located at a first location, and at least one of the plurality of antennas being located at a second location, spatially remote from the first location because it enhanced the air frame timing between cells served by the remote antenna unit (column 1, lines 24-26). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of Toivola, Jeong et al., Campanella, and Shilling to improve the performance of the system.

(2) Regarding claim 11:

Toivola, Jeong et al., Campanella, and Shilling discloses all the subject matter as discuss in claim 1 except at least one antenna being located at a third location, spatially remote from the first location and the second location.

However, Naidu et al. disclose at least one antenna being located at a third location, spatially remote from the first location and the second location (as shown in figure 3, each of the four transmission paths may have different length which cause different delay time for the signal, column 2, lines 50-52).

It is desirable for at least one antenna being located at a third location, spatially remote from the first location and the second location because it equalizes the system without requiring the transmission link to be out of service during the upgrades or repairs (column 9, lines 26-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of Toivola, Jeong et al., Campanella, and Shilling to improve the reliability of the system.

11. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2002/0122008 A1) in view of Takada (US 2002/0196876 A1).

Caimi et al. discloses a receiver assembly comprising:

a plurality of antennas (integrated assembly 150 in figure 13) that each receive an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal (it is inherent that each antenna can

received an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal);

an analog-to-digital converter (plurality of A/D 166 each associated with an integrated assembly 150 as shown in figure 13) that creates a digital representation of each analog signal;

a digital processing component (a control processor (not shown in figure 13), paragraph 0039, lines 31-34) that receives the digital representation of each analog signal and produces a control signal from each digital representation, representing an associated antenna (control signal 137 in figure 10 is generated by the transmitter/receiver 130, and another embodiment shown in figure 13 shown that the received signals from each integrated assembly 150 passed through an A/D 166 before the receiver/transmitter block, therefore, the control signal 153 is produce from each digital representation representing an associated antenna), specifying the at least one frequency band containing the interfering signal (filter 132 may additionally comprises a notch at the frequency of a nearby emitter, or at the frequency of an intermodulation product, paragraph 0035; a control processor controls the parameters of the digital filters 170 and the phase shifters 172 to select or reject a particular signal, paragraph 0039; frequency selective antennas can be dynamically tuned to enhance the selectivity of the antenna against nearby in0band interference signals, paragraph 0040, lines 11-14); and

a plurality of electrically adjustable passband filters (digital adjustable filters 170 in figure 13), each electrically adjustable passband filter being associated with one of

the plurality of antennas (each filter 170 is associated with an integrated assembly 150 as shown in figure 13), a given electrically adjustable passband filter being electrically adjustable to change respective associated center frequencies of at least one passband associated with the filter in response to the control signal associated with the associated antenna of the given adjustable filter as to attenuate the specified at least one frequency band within the analog signal received at the associated antenna of the given adjustable filter (the filter in the integrated assembly may additionally comprises a notch at the frequency of a nearby emitter, or at the frequency of an intermodulation product, paragraph 0035; a control processor controls the parameters of the digital filters 170 and the phase shifters 172 to select or reject a particular signal, paragraph 0039).

Caimi et al. fails to discloses a processing component that receives a digital and specifying the at least one frequency band containing the interfering signal.

However, Takada discloses an interference signal removal system that comprises an interference wave detector (B5 and B6 in figure 5(a)) that detect interference wave contain in the input signal, and a controller B7 controls the frequency bands of the adaptive filters based on the detection result, figure 5(a), paragraph 0230).

It is desirable to have4 a processor to receive a digital and specifying the at least one frequency band containing the interfering signal because it accurately reduce interference and enhance signal integrity of the received signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Takada in the system of Caimi et al. to improve the reliability of the receiver.

12. Claims 57, 58 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Takada (US 2002/0196876 A1) as applied to claim 56 above, and further in view of Pratt (US6,664,921 B2).

(1) Regarding claim 57:

Caimi et al. and Takada disclose all subject matter as discussed in claim 56 and Caimi further disclose a signal combiner (combiner 144 in figure 19) that combines the analog signals from the plurality of antenna into a multi-carrier signal (since each filter/antenna 136A-136C is with a different center frequency, the output of the combiner 144 is a multi-carrier signal, paragraph 0074-0075).

Caimi et al. fails to disclose an analog-to-digital converter that converts the analog multi-carrier signal into a digital multi-carrier signal.

However, Pratt discloses an analog-to-digital filter after the combiner 155 in figure 4 that creates a digital representation of each analog signal (ADC 165 in figure 4, column 9, lines 40-65).

It is desirable to have an analog-to-digital converter that creates a digital representation of each analog signal because digital data can withstand interference better than analog signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. and Takada to improve the reliability of the system.

(2) Regarding claim 58:

Pratt further discloses a combiner comprising at least one mixer (mixers 150C) for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency (the mixers 150C serve as down converters, converting the received signals to an intermediate frequency, column 9, lines 57-59).

It is desirable for the combiner comprising at least one mixer for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency because it can remove interference in the signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. and Takada to improve the performance of the system.

(3) Regarding claim 61:

Pratt further discloses that the signal combiner (combiner 155 and PRBS code generator 153) comprising a plurality of coders (code 1 to K) that provide respective spreading codes to the analog carrier signals, the respective spreading codes being mutually orthogonal (column 9, lines 46-51, the despreading codes may be signals constituting an orthogonal set, column 4, lines 20-21).

It is desirable for the signal combiner comprising a plurality of coders that provide respective spreading codes to the analog carrier signals and the codes are mutually orthogonal because it improves the processing gain of the received signal. Therefore, it would have been obvious to one of ordinary skill in the art tat the time of invention to

employ the teaching of Pratt in the receiver of Caimi et al. and Takada to improve the gain of the receiver signal.

13. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Takada (US 2002/0196876 A1) and Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Chitrapu et al. (US 2006/0072520 A1).

Caimi et al., Takada and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a frequency multiplexer.

However, Chitrapu discloses a frequency multiplexer (428 in figure 4) that combines the various control signals into one signal (paragraph 0022, lines 16-18).

It is desirable for the signal combiner comprising a frequency multiplexer because it prevent the need for duplicate processing circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Chitrapu et al. in the system of Caimi et al., Takada and Pratt to reduce the complexity of the system.

14. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Takada (US 2002/0196876 A1) and Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Lee (US 6,473,416 B1).

Caimi et al., Takada and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a code division multiple access multiplexer.

However, Lee discloses a code division multiple access multiplexer (mux 100 in figure 3) that combines signals inputted through a plurality of channels (column 4, lines 39-41).

It is desirable for the signal combiner comprising a code division multiple access multiplexer because it prevent the need for duplicate processing circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Chitrapu et al. in the system of Caimi et al., Takada and Pratt to reduce the complexity of the system.

15. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Takada (US 2002/0196876 A1) and Pratt (US6,664,921 B2) as applied to claim 57, and further in view of Yin (US 2005/0218984 A1).

Caimi et al., Takada and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner.

However, Yin discloses a combiner (int frmr 216 in figure 2) that has a bypass mode and when the combining function of the combiner is not required, the combiner is bypassed (paragraph 0050,lines 16-18).

It is desirable for the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner because it can reduce process time for the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Yin in the system of Caimi et al., Takada and Pratt to reduce the processing time of the system.

16. Claims 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Takada (US 2002/0196876 A1) and Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Naidu et al. (US 6,128,470).

(1) Regarding claim 63:

Caimi et al., Takada and Pratt disclose all the subject matter as discuss in claim 56 except the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location.

However, Naidu et al. discloses the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location (the system comprises a plurality of remote antenna unit 68_1, 68_2, 70_1, 70_2 connect to the base station equipment 50_1 and 50_2 in figure 2, column 1, lines 43-54).

It is desirable for the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location because it reduces the cumulative noise in a distributed antenna network (column 2, lines 48-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of Caimi et al., Takada and Pratt to improve the quality of the system.

(2) Regarding claim 64:

Naidu et al further discloses that a second of the at least one antenna being located at a third location, spatially remote from the first location and the second location (the system comprises a plurality of remote antenna unit 68_1, 68_2, 70_1, 70_2 connect to the base station equipment 50_1 and 50_2 in figure 2, column 1, lines 43-54).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIU M. LEE whose telephone number is (571)270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Siu M Lee/
Examiner, Art Unit 2611
3/25/2009

/Chieh M Fan/

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